

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Copper Converter Design MCP

Engineer precise Peirce-Smith converter circuits for copper smelting.

Copper Converter Design MCP provides the mathematical foundation for designing Peirce-Smith converter circuits. You can use it to size equipment, plan production cycles, and calculate the exact amount of flux needed for slag formation. It also handles environmental modeling, such as off-gas volume and copper recovery from slag, directly within your AI client.

copper

smelting

metallurgy

engineering

smelter



The connectivity layer between AI and the world's software.



Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

Copper Converter Design Tool MCP

4 tools available

Cloud-hosted on Vinkius

Designing Peirce-Smith converter circuits requires precise calculations to ensure production targets and environmental standards are met. This MCP gives your AI client the ability to act as a specialized metallurgical engineering assistant. Instead of manually running formulas, you can ask your agent to size a vessel based on specific production rates or estimate how long an oxidation phase will last for a given batch.

You can use it to manage the chemistry of the process by determining flux requirements for slag formation. It also helps you look ahead at the environmental impact by modeling gas volumes and copper recovery rates. Whether you are sizing new equipment or optimizing an existing production cycle, this MCP handles the heavy lifting of the metallurgical math.

Core Capabilities

01 — Equipment Sizing

Your agent calculates vessel capacity, diameter, and depth based on production goals.

02 — Production Planning

The AI estimates oxidation phase durations to help you schedule converter cycles.

03 — Slag Chemistry Control

The tool determines flux amounts needed to achieve specific slag volumes and ratios.

04 — Environmental Modeling

Your agent evaluates off-gas volumes and copper recovery from slag.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/copper-converter-design-tool — connect your AI agent in three steps.

- 01 Connect your AI client like Claude or Cursor to the Vinkius platform.
- 02 Provide your production parameters, such as matte grade or production rate, to your agent.
- 03 The agent calls the specific engineering tool required for your calculation.
- 04 The MCP returns precise dimensions, times, or mass requirements to your chat interface.

Connect your AI client to Vinkius and start running metallurgical calculations immediately.

Built For

This MCP is built for metallurgical engineers and smelter operators who need to run rapid, accurate design calculations.

Metallurgical Engineer

Uses the tool to design converter circuits and calculate flux requirements.

Smelter Operations Manager

Uses the tool to estimate blowing times and plan daily production cycles.

Process Engineer

Uses the tool to model environmental impacts and copper recovery rates.

What Changes When You Connect

- 01 Reduces manual calculation errors in converter sizing.
- 02 Provides rapid estimates for oxidation phase durations.
- 03 Automates flux and slag volume calculations.

04 Integrates metallurgical math directly into your AI workflow.

Real-World Applications

New Plant Design

Calculate the necessary dimensions for new Peirce-Smith converters to meet target throughput.

Chemical Optimization

Determine the exact amount of flux to add to a matte batch to ensure proper slag formation.

Batch Scheduling

Estimate how long an oxidation phase will take to optimize the timing of the next batch.

Environmental Compliance

Model off-gas volumes and copper recovery to assess the impact of converter operations.

4 Tools Available

#	TOOL	DESCRIPTION
01	analyze_gas_and_slag_recovery	This tool evaluates the environmental impact and copper recovery efficiency of your converter operations.
02	calculate_converter_dimensions	This tool determines the physical size and capacity needed for a converter to hit your production targets.
03	calculate_flux_requirements	This tool calculates the exact mass of flux required to produce the necessary slag volume.
04	estimate_blowing_time	This tool predicts the duration of the oxidation phase for a specific batch of matte.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U What size converter do I need for a production rate of 50 tonnes of copper per hour with a matte grade of 45% and a 10 hour cycle time?



The required converter will have a vessel capacity of 650 tonnes, a diameter of 5.2 meters, and a depth of 4.5 meters.

U How long will it take to convert a 100 tonne matte batch with 40% copper grade and 80% oxygen availability?



The blowing duration for this batch is estimated to be 145 minutes.

U How much flux is needed for a 150 tonne matte batch at 35% copper grade with a silica ratio of 0.25?



The required flux mass is 42.5 tonnes, resulting in a slag volume of 38.2 cubic meters.

Frequently Asked Questions

01 What kind of converters can I design with this MCP?

This MCP is specifically designed for Peirce-Smith converter circuits used in copper smelting.

02 Can I use this with Claude or Cursor?

Yes, you can connect this MCP to any compatible client including Claude, Cursor, and Windsurf.

03 Does this tool help with environmental modeling?

Yes, it includes a tool to analyze off-gas volume and copper recovery from slag.

04 How does it handle flux calculations?

The MCP calculates the required flux mass needed to create the necessary slag volume for a given batch.

05 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you. You just connect your client and start working.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

`https://edge.vinkius.com/[TOKEN]/mcp`

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"copper-converter-design-tool": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  Ask ChatGPT 
-  Ask Claude 
-  Ask Perplexity 
-  Ask Gemini 
-  Ask Grok 

READY TO CONNECT

Copper Converter Design Tool is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

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Server ID	01a085fa-dc96-7084-b3b9-e57bdd74ea34
Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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